Patoka River Watershed Restoration Action Strategy

Part II: Concerns and Recommendations

Prepared by

Indiana Department of
Environmental Management
Office of Water Management

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Foreword

The First Draft (October 1999) of the Watershed Restoration Action Strategy (WRAS) was reviewed internally by IDEM and revised accordingly. The Second Draft (Spring 2000) was reviewed by stakeholders and revised accordingly. This Third Draft (June 2000) is intended to be a living document to assist restoration and protection efforts of stakeholders in their sub-watersheds. As a "living document" information contained within the WRAS will need to be revised and updated periodically.

The WRAS is divided into two parts: Part I, Characterization and Responsibilities and Part II, Concerns and Recommendations.

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Patoka River Watershed Restoration Action Strategy Part II: Concerns and Recommendations

Part II of the Watershed Restoration Action Strategy discusses the water quality concerns identified for the Patoka River Watershed and lists recommended management strategies to address these concerns.

Part II includes:

1 Water Quality Concerns and Priority Issues Identified by Stakeholder Groups

The Patoka River watershed contains potential stakeholder groups that have different missions. Many of these groups have a long history of working in the Patoka River watershed. The following discussion briefly describes some of the watershed groups and lists their priorities and concerns.

SWCD's & NRCS & IDNR Div. of Soil Agencies

In Dubois, Gibson, and Pike Counties, the field office personnel of the Natural Resources Conservation Service and IDNR Division of Soil Conservation, along with the Soil and Water Conservation Districts have identified that soil erosion and animal waste are concerns in the Patoka River watershed.

In Orange, Crawford, Martin and Warrick Counties, the field office personnel of the Natural Resources Conservation Service and IDNR Division of Soil Conservation, along with the Soil and Water Conservation Districts did not identify any major natural resource concerns in the Patoka watershed areas in their counties.

Within some areas of the Patoka River watershed, a big concern is the large amount of manure being produced by the poultry and turkey industry. Soil phosphorus levels need to be aggressively managed because some of the fields are reaching 1000 parts per million (Pitstick 1999). Some of the livestock operations store the manure on the top or side of a hill until an opportunity to spread it becomes available. A few producers do not maintain a grass filter area below the manure and it washes down to waterbodies. Several of the poultry and turkey operations are located on sites where spreading acreage is limited. Many of the livestock operations in Dubois County need a dry stacking manure system to help manage the manure problem (Pitstick 1999).

Dead poultry are presently being buried or stored in holding tanks in the ground. While some of these tanks get cleaned out, others are left in the ground and may leak in time. Livestock operations would benefit from an animal composting system (Pitstick 1999).

Every spring and fall, the Dubois County Purdue Cooperative Extension Service receives numerous complaints of hog manure odor. Many homes are being constructed closer to existing animal feeding operations (Peters, 1999).

Local Board of Health Departments

The County Health Departments within the Patoka River watershed are constantly challenged in assisting homeowners with their septic systems. In all of the counties of the Patoka River watershed, the two most common septic system related problems are poorly drained soils with fragipans and seasonal high water tables. Also, some home sites have slopes of 15% or greater, which makes percolation very difficult.

Many of the counties are using alternative septic systems or modified techniques. For example, in Dubois county, approximately 45 sand mound systems are typically installed per year because the standard system will not work (Oeding, 1999). Many of the systems in Pike County are constructed with the filtering line trenches at twice the normal width because of the clay content and closeness to shale (Walker,1999). Most of the newer systems are installed with more linear footage in the adsorption area and a perimeter drain.

Every county varies in the number of septic system permits issued. In counties like Dubois, urban growth continues with approximately 130 – 150 new permits a year. (Oeding, 1999)

Jasper, the largest community in the Patoka River watershed, has a separate sewer system, however, it needs to expand due to growth and the future addition of the town of Ireland into their treatment system. The Dubois County Health Department averages 160 septic system failures per year around the Jasper community (Oeding, 1999).

Many septic systems receive too much water at one time, and therefore do not function properly. This happens because 90% of the households in Dubois County are served with public water (Oeding, 1999).

Other possible reasons why septic systems fail are:

- lot sizes are too small
- poor soils
- lack of septic system management (such as emptying tank every 2 to 5 years)
- filter field is too small
- weather (too much rain causing soil saturation)
- poor site selection
- decomposing bacteria die from grease and other harmful items
- laundry (should be done in little amounts and more often)

Overall, there is an undetermined number of failing septic systems within the Patoka River watershed. Some of these systems are straight pipe outlets that discharge the septic effluent on the soil surface, in road ditches, in drainage field tile, down hill sides, etc. These systems create a health hazard from the possibility of spreading disease and are illegal.

There are two ways these illicit discharges get upgraded to county standards:
1. the owner sells the property and must disclose it
2. a complaint is filed

To help homeowners understand more about their septic systems, the environmental health specialists provide individual assistance and educational material when permits are issued and/or during site visits

Funding from the Build Indiana and the State Revolving Loan Funds, along with local business & industry donations have secured enough money to connect the towns of Celestine, St. Anthony, St. Marks, Schnellville, and Bretzville to the Patoka Regional Sewer and Water District.

Southwest Indiana Brine Coalition

The Southwest Indiana Brine Coalition is presently targeting brine sites located in Posey, Daviess, Dubois, Vanderburg, Warrick, Gibson, and Pike Counties, that do not have an identified oil operator. They provide technical and possibly financial assistance to landowners with land areas that have soils of high saline concentration from old mining operations. These areas are called brine sites and range from ½ to 5 acres.

Oil and gas drilling activities are quite prolific in Pike and Gibson Counties. In the process of extraction, oil related problems such as salt water and oil spills have impaired water and soil quality. Brine sites on hillsides, cause deep gully erosion from the lack of a vegetative cover and the contaminated sediment moves downhill which continues to sterilize more acres. (Hazlewood,1999) Sites that are close to watercourses are a high priority. The number of brine sites within the seven counties has yet to be determined.

The next phase of the Brine Coalition is to provide more education and possibly technical cost share assistance toward improving the brine sites. The best solution, thus far, is building up the soil organic content by incorporating animal manure, wood chips, grass clippings, etc. The best vegetation that may somewhat grow on these areas has been Tall wheat. (Hazlewood, 1999)

Patoka South Fork Watershed Steering Committee

The South Fork of the Patoka River Watershed is considered the most heavily impacted watershed in the State of Indiana (Patoka South Fork Watershed Steering Committee Brochure, no date). Of the approximately 52,000 acre watershed, between 60 and 75 percent has been impacted or impaired with acid mine drainage. The environmental degradation from acid mine drainage has been well documented by numerous scientific studies. These studies have documented the loss of fish, aquatic insects, and plants due to the inflow of water with low pH, heavy metals, suspended sediments, and precipitates that coat the stream bottoms. (Patoka South Fork Watershed Steering Committee Brochure)

The Committee is mostly working with mined sites that date 1977 and earlier. Located throughout the abandoned mining areas are creeks, streams, pits and ponds. Many of these water sources are very acidic with pH levels of 1 or 2. Heavy iron levels are also present which gives an orange color to the water. The thousands of acres of rolling spoil banks act like

sponges during rainfall, and then slowly release the acid water in the form of seeps and streams.

One solution being implemented is the application of calcium hydroxide in the streams, pits and ponds, which raises the pH levels to 7, 8, or 9. The calcium hydroxide is produced in the forms of liquid or solid material. Other solutions are to apply limestone to the site areas, cover with dirt and plant vegetation or create limestone rock filter basins which neutralize the acid. (Mosley, 1999)

The Committee uses a geographic information system (GIS) and has completed inventorying the area. Prioritization of sites is done on a continual basis, and implementation as funding becomes available. Financial assistance for the implementation of these solutions comes from the Abandon Mine Lands Fund and/or the Appalachian Clean Streams Initiative. The cost of implementation can range from one thousand to half a million dollars per project area.

The Committee also organizes trash pick up and educational activities, such as Adopt-a-River or Adopt-a-Highway events.

Currently, the South Fork tributary has some river segments that support aquatic vegetation and fish. (Mosley, 1999)

Pike County Extension Service

Purdue University and the Pike County Extension Service are producing a document called "Watershed Connections, Water Resources of Pike County, Indiana." The document contains information about the watersheds and water resources of Pike County. It provides detail about point and nonpoint sources of water pollution and lists some things that citizens can do in protecting surface and ground water quality. The document should be available by January 2000.

2 Water Quality Concerns and Priority Issues Identified by State and Federal Agencies

This section presents the combined efforts of state and federal agencies, and universities (such as IDEM, IDNR, USDA-Natural Resources Conservation Service, Ohio River Valley Water Sanitation Commission, Purdue University, Indiana University, Indiana Geologic Survey, and US Geological Survey) to assess water quality concerns and priority issues in the Patoka River Watershed. This multi-organization effort formed the basis of the Unified Watershed Assessment for Indiana. At this time, the Unified Watershed Assessment has been completed for 1998 and 2000-2001, as described below.

Indiana's 1998 Unified Watershed Assessment (UWA)

The UWA workgroup gathered a wide range of water quality data that could be used to characterize Indiana's water resources. These data were used in Alayers@ in order to sort the 8-digit HUC watersheds according to the present condition of the water in lakes, rivers, and

streams. The workgroup used only those data which concerned the water column, organisms living in the water, or the suitability of the water for supporting aquatic ecosystems. Each Alayer@ of information/data was partitioned by percentiles into scores. The scores ranged between one and five, with a score of one indicative of good water quality or minimum impairment, and a score of five indicating heavily impacted or degraded water quality. The scoring derived through the UWA process is presented in Table 2-1.

The data layers listed in Table 2-1 can be defined as:

- Lake Fishery: Large mouth bass community information for lakes
- Stream Fishery: Small mouth bass community information for streams
- Aquatic Life Use Support: The livability of the water column for aquatic life, determined from evaluation of chemical and physical water data, and assessment of aquatic life
- Fish Consumption Advisories: Site specific advisories based on current data
- Fish Index of Biotic Integrity: Based on fish community diversity and fish health
- Qualitative Habitat Evaluation Index: Measure of whether the aquatic habitat is suitable for diverse communities, based on visual observations
- Lake Trophic Scores: Indicator for the rate at which a lake is >aging= due to inputs of nutrients and other factors
- Sediment Potential: Indicator of potential sediment input to waterbodies in the watershed

The sources and additional information for these data layers include:

- Lake Fishery: From IDNR fisheries surveys of lakes and reservoirs from 1972 to 1994. Raw scores were averaged for all lakes in the watershed
- Stream Fishery: From IDNR fisheries surveys of streams from 1970 to 1994. Raw scores were averaged for all streams in the watershed
- Aquatic Life Use Support: IDEM, Office of Water Management, Assessment Branch
- Fish Consumption Advisories: ISDH and IDEM, Office of Water Management, Assessment Branch
- Fish Index of Biotic Integrity: IDEM, Office of Water Management, Assessment Branch
- Qualitative Habitat Evaluation Index: IDEM, Office of Water Management, Assessment Branch
- Lake Trophic Scores: Indiana Clean Lakes Program through IDEM, Office of Water Management, Assessment Branch. This score was based on information gathered from sampling conducted in the 1970's and 1980's
- Sediment Potential: U.S. Geological Survey scored the population rate of change and the 1996 Conservation Tillage Transect data. The scores were then added and normalized to produce a sediment yield indicator for each watershed

TABLE 2-1
RESULTS OF THE UNIFIED WATERSHED ASSESSMENT
FOR PATOKA RIVER

Data/Information Layer	Patoka River (05120209) Score
Stream Fishery	5
Aquatic Life Use Support	2
Fish Consumption Advisories	3
Recreational/Swimming	1
Lake Trophic Scores	2
Sediment Potential	5

Note:
The UWA scores range from one to five, with a score of one indicating good water quality and a score of five indicating severe impairment.

Indiana's 2000-2001 Unified Watershed Assessment (UWA)

During summer 1999 the UWA workgroup used additional layers of information to identify the **resource concerns and stressors** for each of the 361 11-digit watersheds in Indiana. Examination of the human activities that have the potential to impact the ecosystem will help planners to focus on those areas where restoration may be most critical. Organizations can identify opportunities to use their programs and resources to address those areas.

This focusing process will illuminate areas where the interests of two or more partner agencies may converge. It is intended that this will lead to more effective allocation of resources for restoration and protection activities. At the local level, this information can assist groups to prioritize watershed activities and provide some discussion points for planning.

This amended assessment has the following benefits:

- Provides a logical process for targeting funds, which may be expanded or updated without changing the basic framework.
- Provides information at a finer resolution (11-digit hydrologic units) to agencies and local groups interested in watershed assessment.
- Identifies data gaps.
- Can be used as a compliment to other assessments, such as the 305(b) Report and 303(d) List.

Table 2-2 and Figure 2-1 show the results of the 2000-2001 UWA for the Patoka River watershed.

3 Identification of Impaired Waters

Section 303(d) of the Clean Water Act requires states to identify waters that do not or are not expected to meet applicable water quality standards with federal technology based standards alone. States are also required to develop a priority ranking for these waters taking into account the severity of the pollution and the designated uses of the waters. Indiana's 303(d) list was approved by EPA on February 16, 1999.

Once the Section 303(d) list and ranking of waters is completed, the states are required to develop Total Maximum Daily Loads (TMDLs) for these waters in order to achieve compliance with the water quality standards. The TMDL is an allocation that determines the point and nonpoint source (plus margin of safety) load reductions required in order for the waterbody to meet water quality standards. IDEM's Office of Water Management has and continues to perform point source waste load allocations for receiving waters. Part I of the WRAS briefly outlines IDEM's strategy for developing TMDLs.

The following Patoka River Watershed waterbodies are on Indiana's 1998 Clean Water Act Section 303(d) list submitted and approved by EPA 303(d) list (Figure 3-1):

- **Patoka Reservoir** fish consumption advisory for Mercury (Severity Ranking: Low)
- **Patoka River** fish consumption advisories for Mercury and PCB (Severity Ranking: Medium)
- **South Fork Patoka River** for Impaired Biotic Communities (Severity Ranking: High)

4 Priority Issues and Recommended Management Strategies

Part I provided the existing water quality information for the Patoka River watershed and Part II lists priority issues and concerns from local, state, and federal stakeholders in the watershed. This section pulls together the priority issues and concerns held by all stakeholders and recommends management strategies. Underlying all discussions of priority issues and concerns is the fact that improving water quality in the Patoka River Watershed will also enhance the natural and recreational values of Patoka River. Each subsection below focuses on a single priority issue.

4.1 Data\Information and Targeting

In the Patoka River watershed many of the stakeholders groups have identified numerous concerns. Some groups have targeted and identified problem areas on geographic information systems, while other groups are targeting areas on topographic or other types of maps. It appears that there is enough information that a watershed plan could be written and implementation started.

Recommended Management Strategy 1: Make sure that communication continues between the local SWCD's, the natural resource agencies, local county government agencies, and other active stakeholder groups, focusing on present accomplishments and future planning.

Continue to inform the watershed community about the past, present, and future desired condition of the watershed area that is being worked on.

Recommended Management Strategy 2: Develop a watershed plan. Involve every active stakeholder group and list all their efforts and accomplishments. Pull these items into one document looking at the broad watershed picture, while managing and implementing at smaller workable units. If possible, work with smaller land units such as 14 digit HUC watershed areas (Figure 2-2 of Part I) where positive improvements may be noticed and publicized.

4.2 Failing Septic Systems and Straight Pipe Discharges

Local county health departments and other stakeholders have identified failing septic systems and straight pipe discharge from septic tanks as sources of water pollution in the Patoka River watershed. Straight pipe discharges from septic tanks and septic tanks connected to drainage tiles are illegal (327 IAC 5-1-1.5), however, these practices are ongoing in the Patoka River watershed.

Recommended Management Strategy: : All of the environmental specialists of the local health departments have stressed that more education is needed pertaining to septic system management. Developing a workshop for the rural customers which provides information on septic system maintenance, the impacts of failed septic systems, regulations, alternative treatment systems, and financial assistance (if any) may be a good start. Local stakeholders could possibly partner to help share in the cost of the program. To further these educational efforts, the direct impact of communities discharging their septic tank effluent to waterbodies needs to be adequately characterized. This will involve coordination between the Office of Water Management, local health departments, Indiana State Department of Health, and other stakeholders. The option of choice to eliminate the illegal discharges will be a cooperative effort between homeowners and local, state, and federal stakeholders. If a cooperative solution can not be reached, illegal dischargers will be required to cease discharge until they obtain an appropriate NPDES permit.

4.3 Water Quality - General

The Clean Water Act Section 303(d) list presented in Section 6.3 lists water quality-limited waterbodies for the Patoka River watershed.

Recommended Management Strategy: The Clean Water Act requires states to complete TMDLs for waterbodies listed on the Section 303(d) list. The Office of Water Management is currently evaluating and exploring the modeling process and data needs required to complete TMDLs for the Section 303(d) listed waterbodies in the Patoka River watershed. Completion of a TMDL will involve loading allocations of a pollutant to both point and nonpoint sources. The Office of Water Management is currently drafting a TMDL strategy that involves stakeholder input throughout the process.

4.4 Fish Consumption Advisories

As noted in Part I and Part II, fish consumption advisories are a concern within the Patoka River watershed.

Recommended Management Strategy 1: Any person eating fish from the Patoka Reservoir or the Patoka River or its tributaries, should check the fish consumption advisory every year and follow the recommendations. Soil and Water Conservation Districts could run yearly spring articles about fish consumption recommendations through local media sources or their newsletter.

4.5 Nonpoint Source Pollution - General

Nonpoint source pollution contributions are often difficult to assess or quantify. Currently, loadings of nonpoint source pollutants to water are often inferred by examination of land use practices, without actual measurements. In addition, the actual water quality impairments related to nonpoint source pollutants have not been well characterized in the Patoka River watershed. Finally, very few regulatory control mechanisms exist to control nonpoint source pollution.

Recommended Management Strategy 1: Numerous funding mechanisms, such as Conservation Reserve Program, Environmental Quality Incentive Program, Lake and River Enhancement program, and 319(h) grants, exist to promote practices to reduce nonpoint source pollution in the watershed.

4.6 Point Sources - General

Recommended Management Strategy: The Permitting and Compliance Branch of the Office of Water Management is responsible for issuing and monitoring compliance of NPDES permit holders. Clearly, more emphasis and resources are needed to identify and correct illegal point sources and noncomplying point sources. Improving compliance of NPDES dischargers and identifying illicit dischargers will involve fostering a working relationship with other local, state, and federal stakeholders to monitor compliance and report unusual discharges or stream appearance. In regards to illicit discharges, the Office of Water Management will work with local, state, and federal stakeholders to identify and eliminate these sources of water pollution.

5 Future Expectations and Actions

As discussed in Part I, this Watershed Restoration Action Strategy is intended to be fluid document that will be revised or amended as new information becomes available. Section 5.1 discusses expectations derived from the Strategy and how progress will be measured. Specific revisions and amendments to the Watershed Restoration Action Strategy are discussed in Section 5.2. Finally, the Watershed Restoration Action Strategy will be reviewed by all stakeholders before it becomes final, as described in Section 5.3.

5.1 Expectations and Measuring Progress

The Patoka River Strategy provides a starting point to address water quality concerns held by local, state, and federal stakeholders. Part II provides recommended management strategies to address these concerns. Through cooperative efforts with stakeholders, all of the recommended management strategies listed will begin implementation by the summer of 2000.

Measurement of progress is critical to the success of any plan. Water quality improvements will not take place overnight. Measuring of progress in terms of water quality will be provided through the Office of Water Management Assessment Branch's rotating basin monitoring strategy. Specifically, they will be conducting sampling again in 2001. This will allow an assessment of progress in improving water quality.

5.2 Expected Revisions and Amendments

This Watershed Restoration Action Strategy is intended to provide a starting point to improve water quality and measure the improvement. Hence, this document will require revisions and amendments as new information becomes available. The future revisions and amendments have been divided into those that are expected within the next year (Section 5.2.1) and those that will occur over a long-term basis (Section 5.2.2).

5.2.1 Short Term Revisions and Amendments

The most significant revisions and amendments will likely occur during 2001 and after, as a result of the rotating basin assessments to be completed during 2001. The Section 305(b) assessments will be completed by late 1999 or early 2000. Local, state, and federal stakeholder comments regarding the Watershed Restoration Action Strategy will be addressed in future revisions of the document.

5.2.2 Long Term Revisions and Amendments

The Office of Water Management is moving toward adopting a watershed management approach to solve water quality problems. Part of the watershed approach is the use of a rotating basin management cycle. The Assessment Branch of the Office of Water Management has already adopted this rotating basin cycle in its intensive monitoring and assessment of

Indiana waterbodies (this is in addition to the already established fixed monitoring station monitoring which occurs on a monthly basis). Based on the cycle the Assessment Branch is using, the next intensive monitoring of the Patoka River watershed will occur during the sampling season of 2001. The information from the 2001 monitoring effort will be incorporated into the Watershed Restoration Action Strategy.

In addition, the Watershed Restoration Action Strategy may be revised or amended prior to 2001, if sufficient information becomes available.

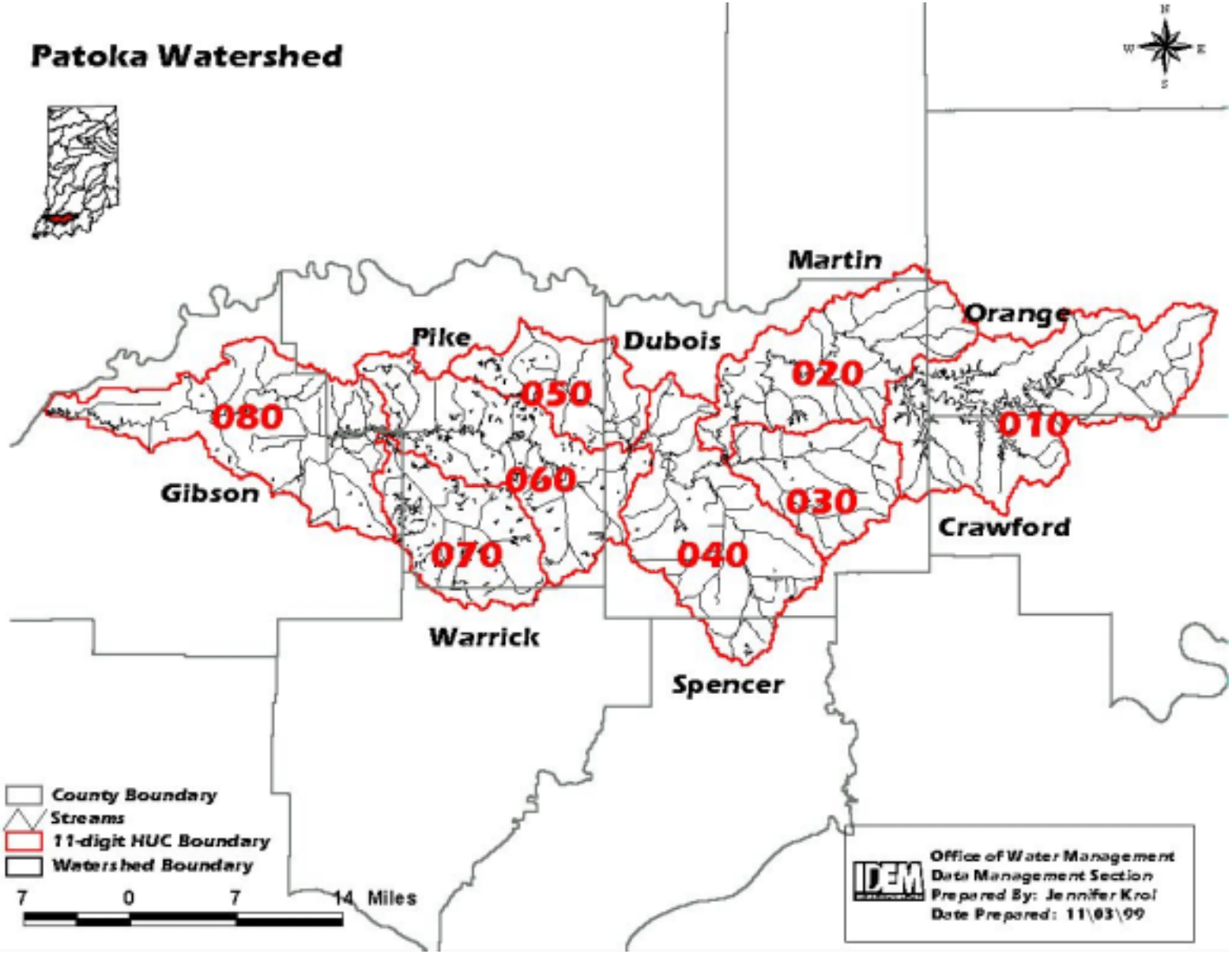
5.3 Review of the Watershed Restoration Action Strategy

Before this Watershed Restoration Action Strategy becomes final, it will undergo rigorous review. The first stage of review will be performed internally by the Office of Water Management. Once the Watershed Restoration Action Strategy has been revised to address internal Office of Water Management comments, it will be circulated to local, state, and federal stakeholders in the watershed and meetings within the watershed will be held to discuss the document. Written comments from local, state, and federal stakeholders will be addressed and the Watershed Restoration Action Strategy will again be revised to incorporate applicable comments. Once internal and external comments have been addressed, the final version of the Watershed Restoration Action Strategy will be released.

TABLE 2-2

HYDROLOGIC UNIT SCORES for Each Parameter Used in the Unified Watershed Assessment [2000-2001]																
11 Digit Hydrologic Unit		Mussel Diversity and Occurrence	Aquatic Life Use Support	Recreational Use Attainment	Stream Fishery	Lake Fishery	Eurasian Milfoil Infestation Status	Lake Trophic Status	Critical Biodiversity Resource	Aquifer Vulnerability	Population Using Surface Water for Drinking Water	Residential Septic System Density	Degree of Urbanization	Density of Livestock	% Cropland	Mineral Extraction Activities
Patoka	05120209010	nd	1	nd	nd	nd	nd	nd	3	5	4	1	2	4	1	2
	05120209020	nd	nd	nd	nd	3	nd	2	2	4	4	2	2	5	2	2
	05120209030	nd	1	nd	nd	nd	nd	nd	2	5	4	2	2	5	2	3
	05120209040	nd	1	nd	nd	5	nd	2	3	3	4	2	2	5	2	4
	05120209050	nd	nd	nd	nd	nd	nd	2	2	2	4	1	2	4	2	5
	05120209060	nd	1	nd	nd	nd	nd	nd	4	3	4	2	2	3	1	5
	05120209070	nd	nd	1	nd	nd	nd	nd	2	3	4	3	2	3	1	5
	05120209080	nd	nd	nd	nd	nd	nd	nd	3	3	3	3	2	3	4	4

Figure 2-1


Patoka Watershed
Martin
Orange
Pike
Dubois
020
050
080
010
060
030
Gibson
Crawford
070
040
Warrick
Spencer
County Boundary
Streams
11-digit HUC Boundary
Watershed Boundary
7 0 7 14 Miles
Office of Water Management
Data Management Section
Prepared By: Jennifer Krol
Date Prepared: 11\03\99